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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,007	07/15/2003	Bruce R. Locke	3303-24	8593

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EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT PAPER NUMBER

1753

DATE MAILED: 09/16/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/620,007

Applicant(s)

LOCKE ET AL.

Examiner

Rodney G. McDonald

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 02 September 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |   |  |
|---|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                      |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)    | Paper No(s)/Mail Date. _____   |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152). |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                                     |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-6, 8, 9, 16-20, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. (U.S. Pat. 6,730,275) in view of Sharma et al. "A Preliminary Study of Pulsed Streamer Corona Discharge for the Degradation of Phenol in Aqueous Solutions", Hazardous Waste & Hazardous Materials, Vol. 10, Number 2, 1993, pp. 209-219.

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Regarding claim 1, Sharma et al. '275 teach a reactor in Figure 1. Having an electrode 114 in the form of a ground electrode in contact with the aqueous mixture 102. (Column 6 lines 6-8) An electrode 110 is located in a position above a surface 112 of the aqueous mixture 102. (Column 6 lines 5-6) A power supply is provided for applying an electrical potential to the electrodes 110, 114 for creating corona discharge. (Column 6 lines 9-12)

Regarding claim 3, Sharma et al. '275 teach the use of pulsed D.C. current. (Sharma et al. '275 Column 6 lines 55-57)

Regarding claim 5, Sharma et al. '275 teach that hydroxyl radicals can be present. (Column 3 lines 52-58)

Regarding claim 6, Sharma et al. '275 teach the use of a catalyst in the vessel. (Column 9 line 20)

Regarding claim 8, the Sharma et al. '275 teach one photocatalyst in the form of  $\text{TiO}_2$ . (Column 9 line 37)

Regarding claim 9, Sharma et al. '275 teach the use of one platinum catalyst. (Column 9 line 38)

Regarding claim 16, Sharma et al. '275 teach generating a discharge in an oxidative process for chemical oxidation. (Column 9 lines 13-16, line 21) The chemical reactive species is ozone. (Column 9 line 16)

Regarding claim 17, Sharma et al. '275 teach the use of pulsed D.C. current. (Sharma et al. '275 Column 6 lines 55-57)

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Regarding claim 19, Sharma et al. '275 ozone can be produced. (Column 9 line 16)

Regarding claim 20, Sharma et al. '275 teach the use of a catalyst. (Column 9 line 20)

Regarding claim 22, the Sharma et al. '275 teach one photocatalyst in the form of  $\text{TiO}_2$ . (Column 9 line 37)

Regarding claim 23, Sharma et al. '275 teach the use of one platinum catalyst. (Column 9 line 38)

The differences between Sharma et al. '275 and the present claims is the locating of Sharma et al. '275 ground electrode to the central location and of the chamber and providing an electrode in the aqueous medium for generating discharge is not discussed (Claims 1, 16), the position of the central electrode is not discussed (Claims 2, 16), the reactive liquid phase species are not discussed (Claim 4), the discharge across the liquid is not discussed (Claim 16), the reactive liquid species are not discussed (Claim 18),

Regarding the limitation of claims 1, 16 where the ground electrode is in a central location and an electrode is provided in the aqueous medium, Sharma et al. teach in Fig. 2 locating a ground electrode in a central location of a chamber and locating an electrode below the ground electrode for generating corona discharge in an aqueous medium. (See Fig. 2; page 212) A power supply is connected between the electrodes for generating the discharge. (See page 212; Fig. 2)

Regarding claims 2, 16, Sharma et al. teach locating a central ground electrode near the interface of between the gaseous volume and liquid volume. (See Fig. 2)

Regarding claim 4, Sharma et al. teach the reactive liquid phase species of hydroxyl radicals. (See Page 214)

Regarding the discharge across the liquid claim 16, Sharma et al. teach the discharge across the liquid. (See Abstract) Hydroxyl radicals can be produced. (See Page 214)

Regarding claim 18, Sharma et al. hydroxyl radicals can be produced. (See Page 214)

The motivation for locating the ground electrode to the central location of the chamber and providing an electrode in the aqueous medium for generating discharge, by positioning the central electrode, by discharging across the liquid and generating the reactive liquid species because it allows for breakdown of phenols in liquid form.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Sharma et al. '275 by locating the ground electrode to the central location of the chamber and providing an electrode in the aqueous medium for generating discharge, by positioning the central electrode, by discharging across the liquid and generating the reactive liquid species as taught by Sharma et al. because it allows for breakdown of phenols in liquid form.

Claims 7 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. '275 in view of Sharma et al. as applied to claims 1-6, 8, 9, 16-20, 22 and 23 above, and further in view of Naeem (U.S. Pat. 6,130,182).

The difference not yet discussed is the use of a zeolite catalyst in the corona apparatus (Claims 7 and 21).

Regarding claims 7 and 21, Naeem teach a reactor for corona destruction of volatile organic compounds. (See Abstract) The catalyst can comprise a substrate having a first layer of dielectric material, a first electrically conducting layer and a second layer of dielectric layer. (Column 4 lines 39-49) The dielectric layer of the catalyst can be a zeolite material. (Column 3 lines 35-37)

The motivation for utilizing a zeolite material as a catalyst is that it allows for removing a volatile organic compounds. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a zeolite catalyst material in a corona reactor as taught by Naeem because it allows for removing volatile organic compounds.

Claims 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sharma et al. (U.S. Pat. 6,730,275) in view of Naeem (U.S. Pat. 6,130,182).

Regarding claim 10, Sharma et al. teach a reactor in Fig. 1. The reactor has a first electrode 114 disposed in the liquid volume. The reactor has a second electrode disposed in a gaseous volume. The gaseous volume has an interface with the liquid volume. There is a power supply for connecting the first and second electrodes such that a high voltage discharge is generated between the electrodes. (See Fig. 1; Column 6 lines 1-12)

Regarding claim 11, Sharma et al. teach that the discharge can be pulsed by DC pulsed current. (Column 6 lines 57)

Regarding claim 12, Sharma et al. '275 hydroxyl radicals can be produced.  
(Column 11 lines 15)

Regarding claim 13, Sharma et al. '275 teach that ozone can be produced.  
(Column 9 lines 13-16; Column 9 line 21)

Regarding claim 14, Sharma et al. '275 teach that the vessel can contain a non-zeolite catalyst. (Column 9 line 20, line 37-39)

Regarding claim 15, Sharma et al. '275 teach that the catalyst can be a photocatalyst of  $\text{TiO}_2$ . (Column 9 line 38)

The difference not yet discussed is the use of a zeolite catalyst (Claim 10).

Regarding the zeolite catalyst of claim 10, Naeem teach a reactor for corona destruction of volatile organic compounds. (See Abstract) The catalyst can comprise a substrate having a first layer of dielectric material, a first electrically conducting layer and a second layer of dielectric layer. (Column 4 lines 39-49) The dielectric layer of the catalyst can be a zeolite material. (Column 3 lines 35-37)

The motivation for utilizing a zeolite material as a catalyst is that it allows for removing a volatile organic compounds. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Sharma et al. '275 by utilizing a zeolite catalyst as taught by Naeem because it allows for removing volatile organic compounds.

### ***Response to Arguments***

Applicant's arguments filed 9-2-05 have been fully considered but they are not persuasive.



In response to the argument that it would not have been obvious to modify Sharma '275 by utilizing a ground electrode because Sharma's '275 arrangement generates a liquid phase discharge which inherently results in reactive liquid phase species, at least at the surface of the liquid, it is argued that in Sharma '275 the liquid phase discharge occurs at the surface of the liquid but not internal to the liquid. The secondary reference, the Sharma paper, suggest that liquid phase discharge is necessary to achieve direct production of radicals needed for breaking down chemicals. Therefore one of ordinary skill in the art would want both aqueous and gaseous discharge to occur and a central electrode would allow such discharge. (See Sharma '275 and Sharma paper discussed above)

In response to the argument that it would not have been obvious to modify Sharma '275 by utilizing a ground electrode because Sharma's '275 arrangement already dissociates solvent molecules in water to form highly reactive free radicals, it is argued as discussed above that Sharma '275 does not necessarily produce discharge in the liquid volume for producing radicals. Therefore, one of ordinary skill would employ the ground electrode of the Sharma paper to create liquid discharge for producing radicals. The Sharma paper recognize the need for reaction in the liquid and gaseous phase. (See Sharma '275 and the Sharma paper discussed above)

In response to the argument that that it would not have been obvious to modify Sharma '275 by utilizing a ground electrode because Sharma's '275 arrangement already efficiently breaks down phenols, it is argued that the Sharma paper recognizing the need for breaking down phenols in the liquid phase and therefore one of ordinary

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skill in the art would look to place a ground electrode in the apparatus of Sharma '275 for breaking down chemicals in the liquid phase. (See Sharma '275 and Sharma paper discussed above)

In response to the argument that there is no motivation or reason to utilize a catalyst such as zeolite in liquid phase reactors, it is argued that Applicant's claims require that the zeolite catalyst be in the gas or the liquid. Since Naeem recognizes that a zeolite can be utilized in the gas phase such as in corona reactors it would be obvious to one of ordinary skill in the art at the time the invention was made to have employed zeolite catalyst in Sharma's '275 gas phase. (See Sharma '275 and Naeem discussed above)

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rodney G. McDonald  
Primary Examiner  
Art Unit 1753

RM  
September 13, 2005